 699

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

SECRET
SECURITY INFORMATION

25X1

COUNTRY	USSR (Kalinin Oblast)	REPORT	[redacted]
SUBJECT	Projects Conducted at Branch No. 1, Institute 88, Gorodomlya Island	DATE DISTR.	25 August 1953
		NO. OF PAGES	33
DATE OF INFO.	[redacted]	REQUIREMENT	[redacted]
PLACE ACQUIRED	[redacted]	REFERENCES	[redacted]

25X1

25X1

USAF review completed.

THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
THE APPRAISAL OF CONTENT IS TENTATIVE.
(FOR KEY SEE REVERSE)

25X1

[redacted]

1. There were approximately 150 Germans at Gorodomlya organized along the well known lines of the German Air Ministry Research Institute. Soviets were located at key spots to observe the operation and to learn from the Germans.

2. [redacted] first major project was the design of a colloidal pulverizer. The exact purpose of this pulverizer is unknown [redacted] However, [redacted] it was intended to produce very fine particles of material which was to be suspended in a colloidal solution. See sketch on page 6. 25X1 25X1 25X1

3. [redacted] consider the design of pneumatic equipment for three wind tunnels as follows:

   a. "One shot" high pressure wind tunnel with 60 square inch aperture.

   b. "One shot" high pressure wind tunnel with 240 square inch aperture.

   c. "One shot" vacuum wind tunnel with 60 and 240 square inch aperture.

25X1

SECRET

STATE	#x	ARMY	#x	NAVY	#x	AIR	#x	FBI		AEC					

25X1

(Note: Washington Distribution Indicated By "X"; Field Distribution By "#")

 [redacted] 25X1

4. Of the three wind tunnels listed above, the first (a) was actually designed, built, and used at Gorodomlya. The second (b) was designed, and submitted to Institute 88 where [redacted] 25X1 an attempt was made to build it. [For technical information, see sketch, page 9.] The third, (c) only progressed up to the study and discussion stage. A tentative design was made and submitted to Institute 88 [redacted] 25X1

5. [redacted] A detailed technical description of this tunnel, along with drawings and diagrams, are appended to this report. [See sketch page 12].

6. The use of high pressure gases from combustion was studied for use as a supply for wind tunnel operation. This did not progress beyond discussion stage [redacted] [See sketch page 19] 25X1

7. [redacted] designs for valves and regulators for a vacuum 25X1 wind tunnel (240 square inch aperture), [redacted] submitted to 25X1 Institute 88. [redacted] Technical discussion and drawings of this are appended. [See sketch page 21]

8. The next project at Gorodomlya was to design a pressure regulator that maintained a constant pressure of three atmospheres ± 0.1 atmospheres. This regulator was for use in the R-10 missile. The design was sent to Podlipki to Institute 88. [redacted] 25X1 This was near the end of 1950. Technical information on this is appended. [See sketch page 27] 25X1

[redacted] 25X1

RESEARCH AT INSTITUTE 88

10. At Podlipki in 1947, [redacted] bars about three feet long 25X1 and about three inches in diameter that appeared to be made of a compressed black powder. They were standing on the ground floor of a room next to the electrical laboratory. [redacted] 25X1 the Soviets had asked the 25X1 technical director for permission to experiment with the bars.

11. At Podlipki during the waiting period, Dr. UMPFENBACH constructed an experimental rocket combustion chamber. [redacted] 25X1

[redacted] Dr. UMPFENBACH from time to time gave lectures to the Soviets on the theory of rocket combustion chamber design. 25X1 25X1

12. At Gorodomlya in 1950, Dr. ALBRING worked out a design for a supersonic missile shape, but did not submit it to the Soviets for fear of being kept for a longer period of time in the USSR. [redacted] Drs. ALBRING and FREISER [redacted] worked for six months on the computation for this design. 25X1

13. [redacted] There were more than 40 models tested. [redacted] they were mostly conical in shape. 25X1 25X1

14. PREIKSCHAT [redacted] built a radar at Gorodomlya which was tested with aircraft. At least three or four times, PREIKSCHAT was on board the aircraft during the test. The aircraft used was a low power single engine aircraft. There was a total of 30 to 40 tests in all. /This was evidently an experimental missile guidance system. [redacted] The antenna was located on a trailer and was composed of two parabolas two and one-half meters in diameter. [redacted] a radio truck, evidently containing the transmitter and receiver. This was separated from the antenna and there were electrical conduits between the antenna and the radio truck. 25X1 25X1

15. The Germans at Gorodomlya were gradually removed from what the Soviets considered to be secret activity. This was done in the latter part of 1951. Apparently the rocket test stand work was considered secret. From scattered bits of information, it was deduced by the Germans [redacted] that missile activity was being carried out by the Soviets at Podlipki. Examples of this information are as follows: 25X1 25X1

a. Seventy air bottles of the type used in the Gorodomlya wind tunnel were sent to Podlipki.

b. [redacted] All environmental and functional tests were made on [redacted] parts prior to sending them to Podlipki. This indicated that they were in fact going to be used. 25X1

c. [redacted] technical questions from time to time by the Soviets regarding setting and construction of parts that correspond to the design of the large wind tunnel. 25X1

16. In 1951, the Soviets offered the following Germans a four-year contract: Dr. HOCH, FILTER, Dr. STOELLE, TOEPFER, WOLTER, and BLASIG. These men were told that if they did not sign their contracts, their salaries would be cut drastically. [redacted] of this group, only Dr. HOCH preferred to stay in the USSR. 25X1 25X1

PERSONNEL

17. When the bulk of the Germans were repatriated, the Soviets kept 24 of them on the Island. [redacted] this can be considered punishment, rather than retention because of their technical value to the USSR. The names [redacted] of this group are as follows: 25X1 25X1

BUCHNER	LANGE	SCHOLZ
Dipl. Ing. CONRAD	Dr. MAGNUS	Dr. SCHWARZ
FALKENMEYER	POHL	Dr. UMPFENBACH
GROETTRUP	Dr. QUESSEL	VIEBACH
HEINRICH	RANGS	WIESSE
IBEN	Dr. SCHLIER	WOHLFAHRT
JASPER	Prof. SCHMIDT	Dr. ZIESSE

In each case [redacted] there was some incident that could have displeased the Soviets. Dr. GROETTRUP, for example, in obtaining a divorce from his wife for having an affair with a German named COSEL, used German lawyers in Berlin. This divorce could have been obtained through the Soviets. In another case, one of the Germans in the above list became intoxicated one night and sang martial German songs which were heard by Soviet guards. 25X1

18. It was strongly suspected that COSEL was a Soviet agent because he appeared suddenly at Gorodomlya one day, struck up a friendship with GROETTRUP and GROETTRUP's close friends, and, after staying for a short time, left. He was later seen in Moscow by one of the Germans from Gorodomlya with another German woman. COSEL apparently had considerable freedom of movement and was very attentive to the German political attitudes at Gorodomlya.

19. Concerning the characteristics of the Soviets at Gorodomlya, [redacted] 25X1

a. Most of the Soviet engineers were lazy and incompetent. When asked to initiate a project involving creative work, they would work very hard to find a German to carry out the design. They seemed to be content in copying old designs rather than applying what technical knowledge they had to fresh problems.

b. There were a few competent Soviets at Gorodomlya. In several cases, however, these men became familiar with the Germans and were removed from the Island.

c. Political intrigue was very common among the Soviet personnel. Often, some small and inconsequential work done by the Germans was seized upon by a Soviet and represented to his superiors as a result of his own work. There is an example of one Soviet who secured a fairly high position in the Ministry for Armaments by having himself transferred, from a supervisory position in Podlipki over Soviet engineers, to Gorodomlya. At Gorodomlya, the output of the German group so far surpassed that of the Soviet group he had supervised previously that it impressed his superiors. He obtained an opportunity to convince his superiors that

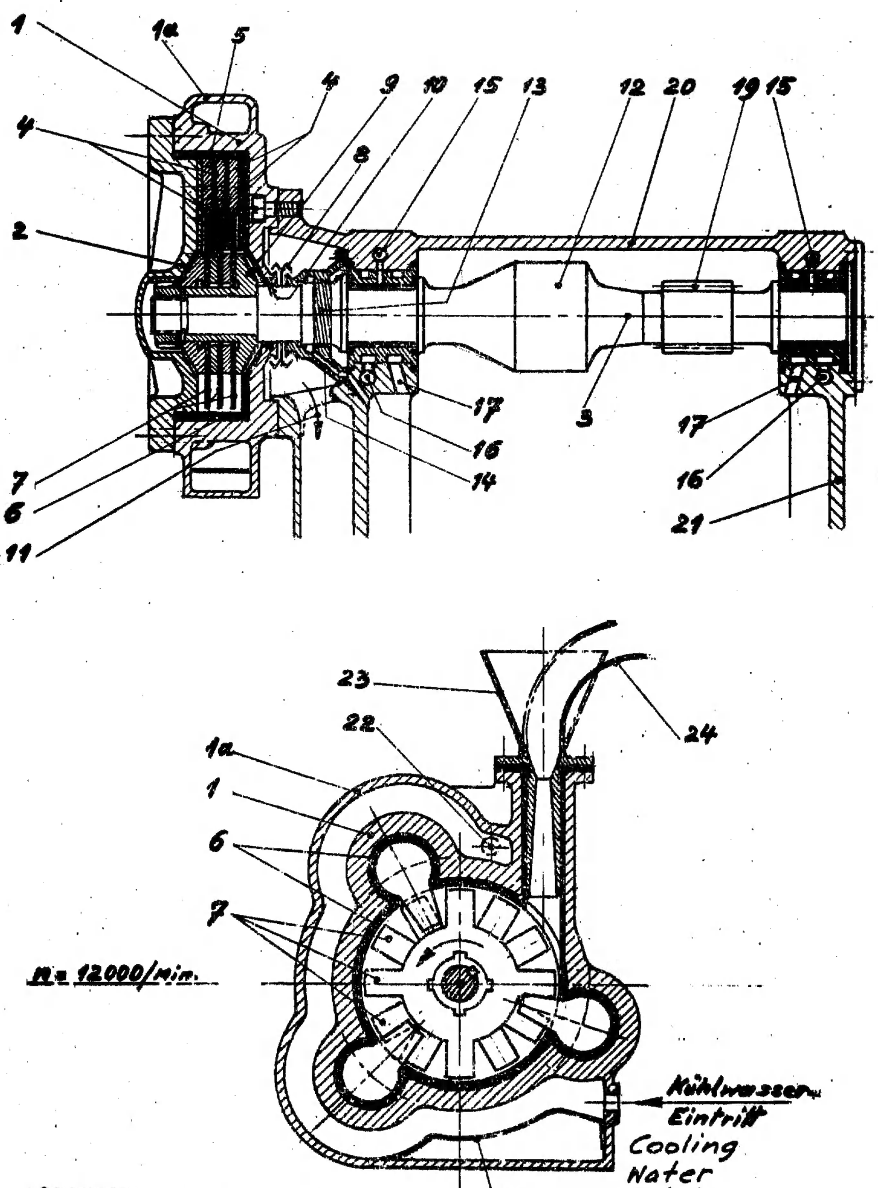
25X1

this was due to his extraordinary understanding of the research carried out there, and his ability to direct his group efficiently. This man's name is GORGANOV and he was unusually incompetent technically. This information was given by GORGANOV's Soviet assistant at Gorodomlya. The assistant claimed that GORGANOV bragged about his intention when he came to Gorodomlya.

Sketch page 6 : Colloidal Pulverizing Mill
Sketch page 9 : Quick Action and Regulating Valve
Sketch page 12: Wind Tunnel
Sketch page 19: Test Stand
Sketch page 21: Quick Opening Valve for Vacuum Wind Tunnel
Sketch page 27: Flow Regulator for the Fuel Supply

25X1

SECRET



Kolloid-Pulvermühle.

For Legend see next page.

COLLOIDAL PULVERIZING MILL

Sketch № 1

SECRET

Description of Colloidal Pulverizing Mill

A. Components

1. Housing for the cross shaped pulverizing disc
1a. Cooling jacket
2. Cover
3. Shaft
4. Striking plate (stationary)
5. End plate
6. Lining (rustproof)
7. Cross shaped pulverizing disc (rotates)
8. Spray and cover rings
9. Return spirals
10. Gasket (carbon)
11. Drain (leakage and powder sludge)
12. Flywheel
13. Return thread (oil)
14. Oil-return line
15. Lubricating oil (to the bearings)
16. Cooling oil (to the bearings)
17. Cooling oil - return line
19. Pinion
20. Transmission case (upper part)
21. Transmission case (lower part)
22. Cooling water - outlet
23. Funnel (for hand operated filling)
24. Pipe (for continuous circulation)
25. Drainpipe for cooling water

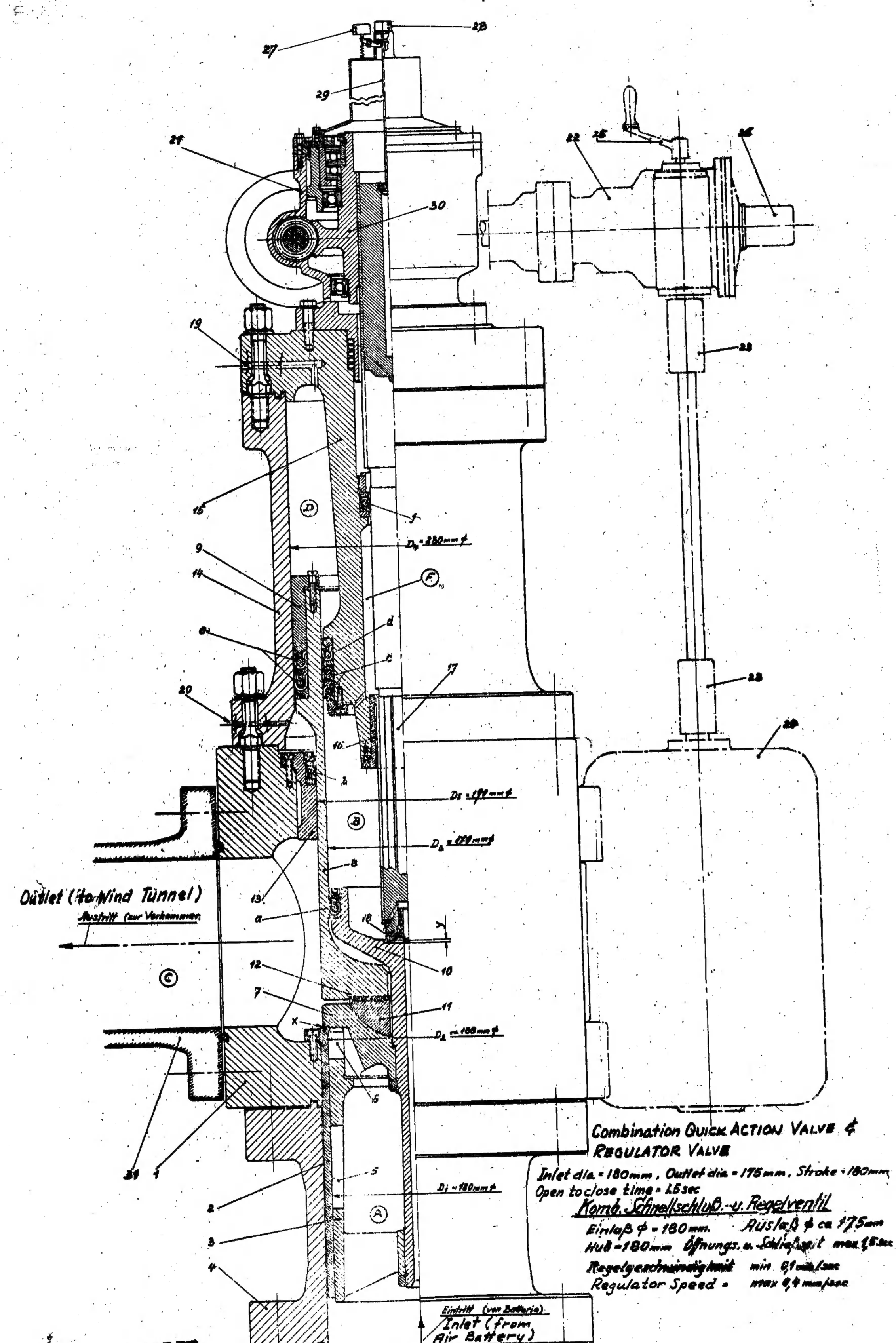
B. Operation

1. This mill was designed [redacted] to pulverize materials [redacted] 25X1
[redacted] The name Colloidal Pulverizing Mill 25X1
suggests that it would be used to manufacture a powder which would be held in colloidal solution.

2. The cruciform rotor, which operates at 12,000 rpm., crushes the material against the stationary striking plates as it is fed from the funnel by hand. The pulverized material flows through the return spirals in the hub to the drain where it is gathered and put back into the funnel. This process is repeated approximately 30 times.

3. The actual operational characteristics of this mill are unknown. A design was made, turned over to the Soviets and nothing further was heard about it.

25X1



SECRET

SECRET

25X1

Combination Quick Action and Regulating Valve

A. Component Description

1. Housing
2. Socket of valve seat (simultaneously controlling slide 3)
3. Slide
4. Barrel extension
5. Passage vent (with increasing opening cross section)
6. Passage vent
7. Valve head (connected to slide 3 through part 10)
8. Piston (Purpose: the necessary closing pressure upon valve seat D2)
9. Upper piston guide
10. Differential pistons (Purpose: relief of ball-thrust part (11), so that the closing pressure, which is flowing above the ball thrust part (11) to the valve seat will be reduced to a minimum pressure. This pressure will be lower, the smaller the area difference of D_2 and D_3)
11. Ball-thrust part
12. Sliding disk
13. Piston guide (on housing)
14. Cylinder
15. Cylinder cover with spindle guide
16. Spindle guide (the spindle is kept from twisting by 6 keyways)
17. Spindle (Purpose: deflection by quick opening of the valve, to a preselected position of the spindle.
18. Ball-thrust part attached to the spindle
19. Intake bore of the closing air (when closing, air will flow from control valve to cylinder; when opening, air will flow to control valve into atmosphere)
20. Leakage from chamber D (When valve is closed, will flow through a small pipe to a hygrometer. Same as in wind tunnel on Gorodomlya)
21. Gearing I Double worm gear transmission $\Big\}\ \frac{1}{30x24} = \frac{1}{1020}$ ratio
22. Gearing II
23. Universal Joint

24. Motor (regulation Leonard)

25. Hand drive

26. Selsyn follow-up

27. Limit switch for closing position of spindle (electric toggle switch will cut off the motor)(front stroke limiter)

28. Limit switch for full open position (rear stroke limiter)

29. Operating or control rod to the limit switches 27 and 28

30. Spindle nut

B. Function of the valve. The operation of the pneumatic part of the valve is the same as in the wind tunnel on Gorodomlya [See sketch page 12]. The regulating valve is not needed with this valve. Dimensions of compressor room, main battery, and testing room are not known to me.

1. Operation. Loading of battery. At the beginning of the test, chambers A, B and C are without pressure. Spindle 17 indicates position, as shown in drawing (approximately 3 millimeters air between spindle 17 and differential piston 10). Then air pressure of 40 atü will be forced from the control battery through the control valve [See sketch page 12]. through intake boring (19) into chamber D. The valve head (7) will be forced by piston (8) upon valve seat x. Piston closing pressure =

$$\pi \left[\left(\frac{D4^2}{4} - \frac{D3^2}{4} \right) \cdot P \right] \text{ minus the friction of sleeves}$$

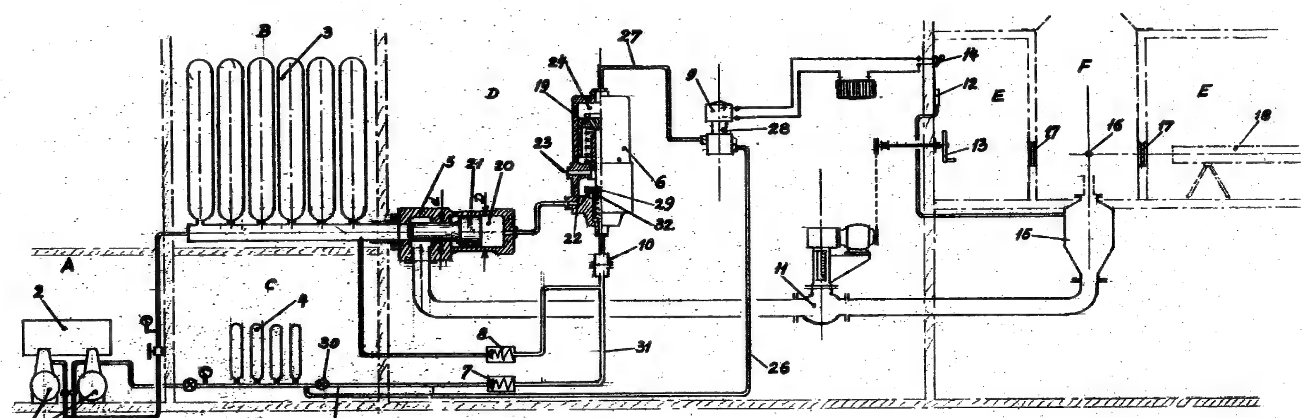
Now, if there is sufficient pressure available in the main battery, then the closing of the piston (9) will be taken over by the main battery. The available closing pressure (valve seat pressure) will be:

$$\underbrace{\pi \left[\left(\frac{D4^2}{4} - \frac{D3^2}{4} \right) \cdot P \right]}_{\text{acting in closing direction}} - \underbrace{\pi \left[\left(\frac{D2^2}{4} - \frac{D3^2}{4} \right) \cdot P \right]}_{\text{acting against the closing pressure}} \text{ minus the friction of the sleeves}$$

2. Test. First the spindle (17) will be driven upward by the motor (24) to a preselected position, depending on the battery pressure and the particular test (slot y will therefore be enlarged). The control valve in the testing chamber is then opened. The closing pressure air will escape through bore (19) to the control valve and from there into the atmosphere. Then, pressure in chamber A will open the valve. Slide (3) with piston (8) move upward, until the differential piston (10) touches the spindle (slot y = 0). The opening velocity can be changed by inserting an orifice at the outlet of bore (19). The raised slide (3) will now permit the battery pressure to flow through the openings 5 and 6 from chamber A through outlet (31) directly to the wind tunnel. The outlets 5 and 6 are made according to a calculated curve to produce a constant flow of air as the battery pressure decreases.

3. Closing of the valve. Same as in wind tunnel at Gorodomlya. [See sketch page 12]

25X1



Gesamtplan des Windkanals.

SECRET

Raumaufteilung

A *Kompressorraum* — Compressor Room

B *Batterieraum* — Battery Room

C *Steuerbatterieraum* — Control Battery Room

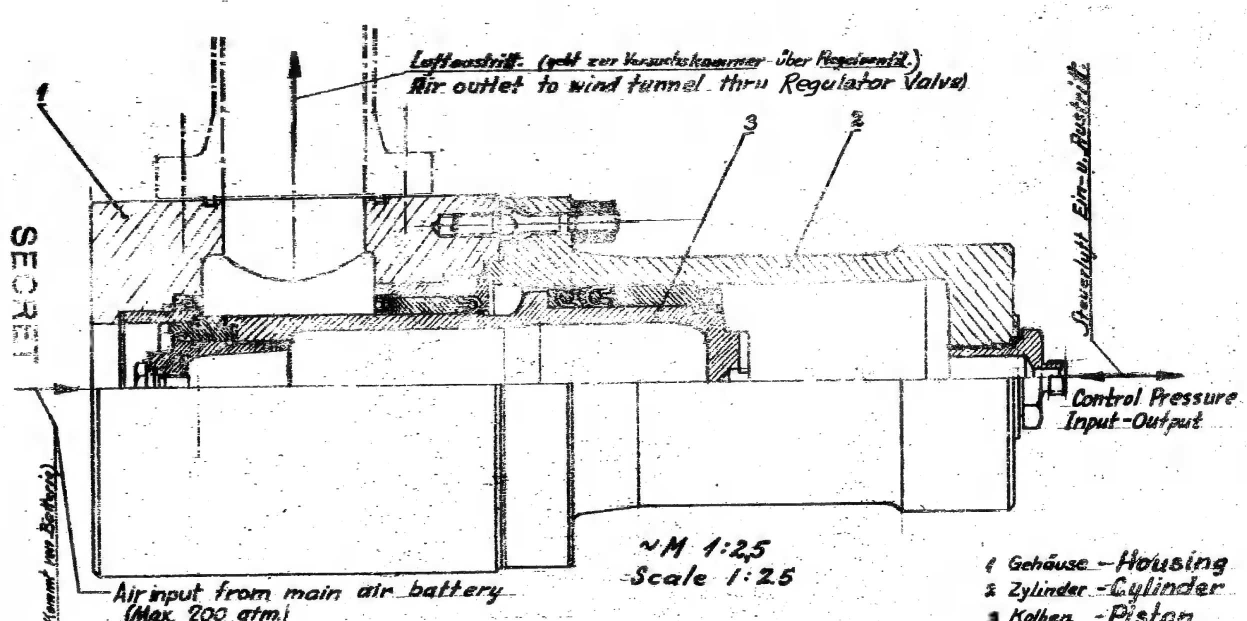
D *Ventilraum* — Valve Room

E *Versuchsraum* — Control Room

F *DruckKammer.* — Test Chamber

Note: The battery is acthally composed of 36 bottles, 6 Quick Action Valves, 6 Regulator Valves, and 6 Solenoid Valves arranged in parallel.

Sketch #1 Overall Plan of WIND TUNNEL
(60 sq.in. orifice out of Quick Action Valve)



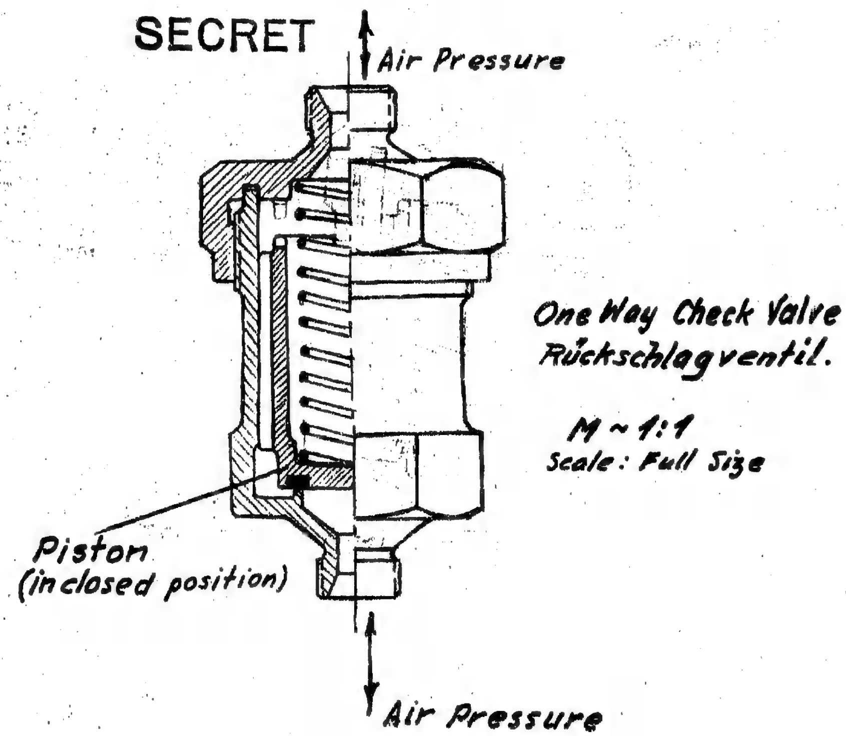
Quick Action Valve

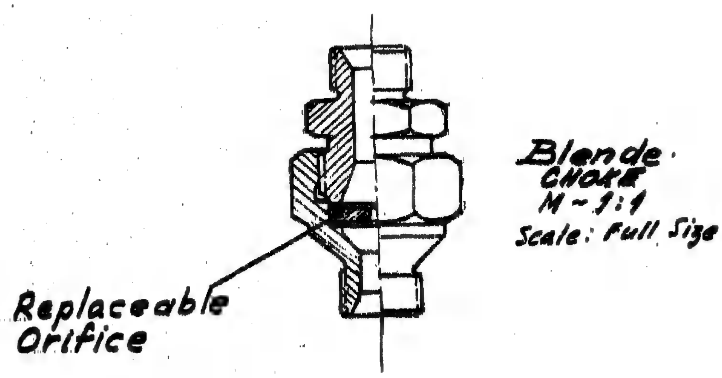
Schnellschlußventil (zum Windkanal Gorodomlia)
(of the Gorodomlya Wind Tunnel)
(In geschlossener Stellung)
(In closed position)

Sketch #2

25X1

SECRET



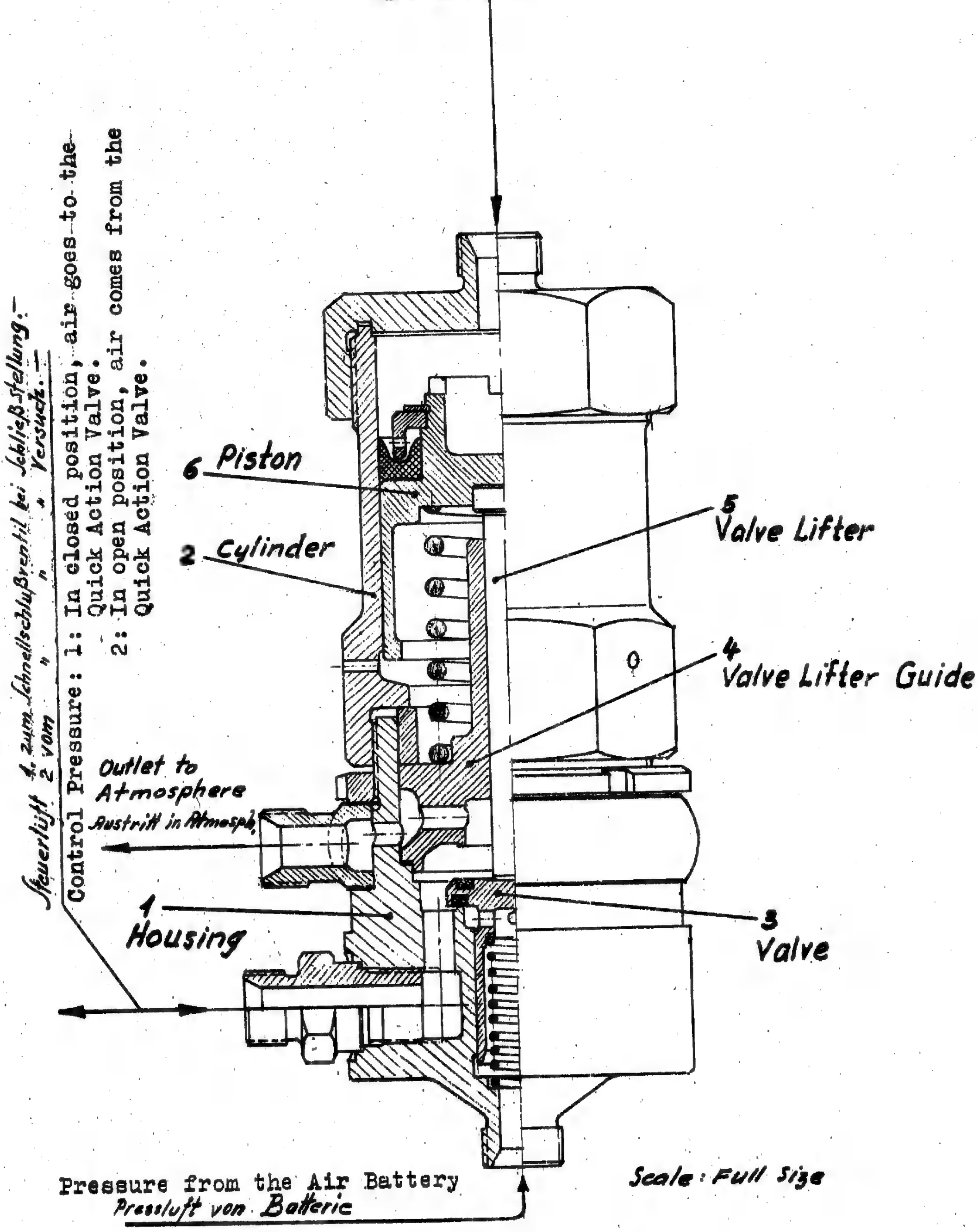


Sketch #3

SECRET

25X1

SECRET



Pneumat. Steuerventil (zum Schnellschlußventil.)
(gezeichnet in Stellung: Schnellschl-Ventil offen. = Versuch.)

Pneumatic Control Valve of the Quick Action Valve

(Shown In the open position)

Sketch #4

SECRET

Description of the Gorodomlya Wind Tunnel

[redacted] left out minor parts in order to obtain a better over-all diagram. 25X1

A. Description of the component parts labeled in the attached sketches.

Component 1 - Two compressors, each approximately 50 horsepower.

Component 2 - Control panel.

Component 3 - 36 compressed air bottles approximately 600 millimeters in diameter, 5 or 6 meters long. Maximum pressure - 200 atmospheres.

Purpose: Battery for the compressed air necessary for the test.

Component 4 - Four to six compressed air bottles approximately 130 millimeters in diameter, 800 millimeters long. Maximum pressure: 45 atmospheres.

Purpose: The control battery will furnish pressure to lock piston (21) when there is no pressure in the main battery bottles.

Component 5 - Quick action valve approximately 80 millimeters in diameter. The input diameter is approximately 116 millimeters. Maximum pressure: 200 atmospheres. In the actual physical layout, there are 6 quick opening valves, (5) with 36 compressed air bottles.

Component 6 - Control valve. Air pressure on piston 19 is 58 atmospheres.

Purpose: To control air from main battery to wind tunnel.

Components 7 and 8 - Check valves.

Component 9 - Solenoid valve (type Pe-4 from the A-4 rocket).

Purpose: Allows remote control of control valve.

Component 10 - Orifice.

Purpose: Controls the opening and closing speed of the quick action valve (5).

Component 11 - Regulating valve.

Purpose: Keeps a constant pressure in chamber (15) during the entire testing pressure in spite of diminishing pressure from battery (3). This is done by two methods.

1. With hand winding gear (13, by observation of a manometer 13).

2. Controlled by an electrically operated switch which makes the appropriate change of pressure within the test chamber by a servo system.

Component 12 - Manometer

Purpose: Manometer indicates the test chamber pressure.

Component 13 - Hand wheel for controlling hand regulator valve.

Component 14 - Switch for operation of quick action valve.

Component 15 - Test chamber.

Component 16 - Calibrated model mounting used to measure dynamic forces during the test.

Component 17 - Observation window.

Component 18 - Optical instrument for high speed photographic recording.

B. Technical discussion of Air Supply System for Gorodomlya Island Wind Tunnel.

1. General

a. High pressure air is furnished from a group of 36 air bottles called the air battery. The compressors filled this battery of bottles connected in parallel up to a pressure of 200 atmospheres. Then, by means of a quick action valve, the air from the battery is released to the wind tunnel where scale models were tested.

b. Auxiliary or control air bottles furnished pressure to the quick action valve. The pressure at the testing point of the wind tunnel is kept constant by a servo system that measures the air pressure by an electro-mechanical pick off. This controls the motor which operates a pneumatic regulator in series with the air line from the air battery. Although familiar with the design and operation of the Air Supply System, [redacted] know very little about how exact the wind tunnel pressure was kept or the purpose of the project for which the wind tunnel was used. 25X1

2. Sequence of operation.

a. Control battery is pumped up to 40 atmospheres.

b. The initial pressure of the main battery - 1 atmosphere.

c. The initial condition of the small piston in the control valve is open.

d. 40 atmosphere pressure from the control battery closes the quick action valve.

e. Air from the compressors is then pumped into the main battery.

f. When the pressure exceeds 40 atmospheres, the one way valve allows the main battery pressure to go through the control valve and keep the quick action valve closed because of the higher force on the other end of the piston.

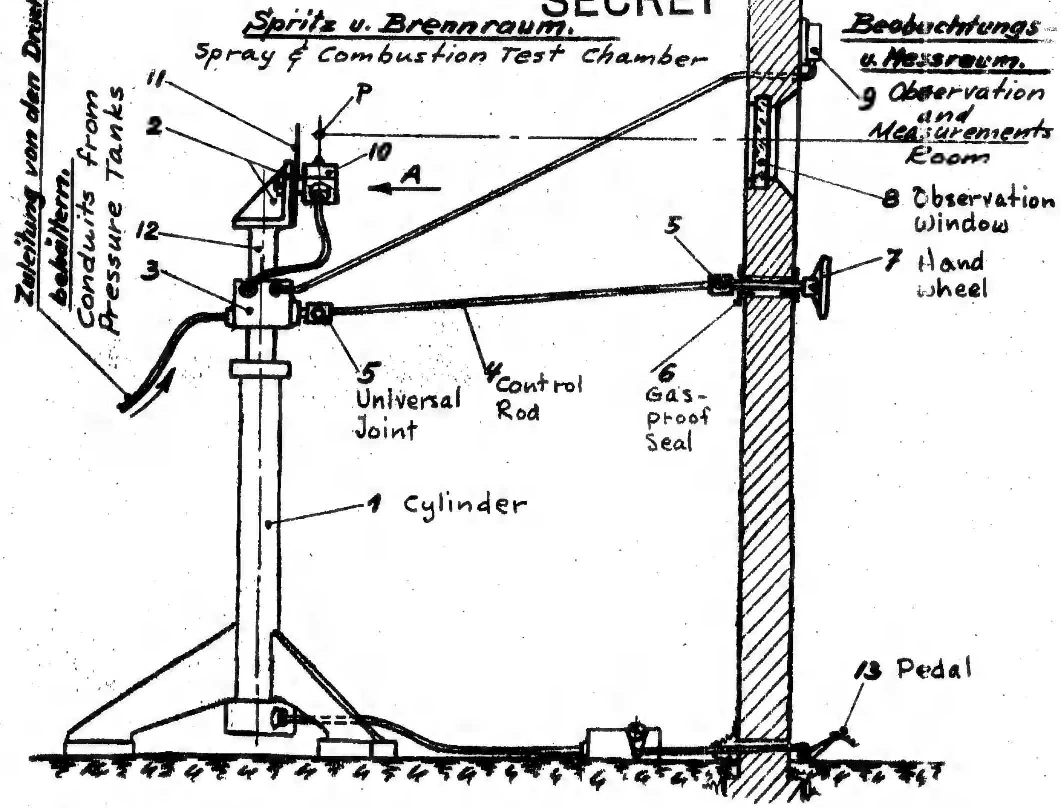
g. The quick action valve remains closed until the maximum pressure of 200 atmospheres is reached in the air battery. In order to obtain air for testing purposes, a solenoid valve is energized. This applies pressure to the large cylinder in the control valve through a push rod or valve lift (Stoessel). This pushes the small cylinder and closes the control valve.

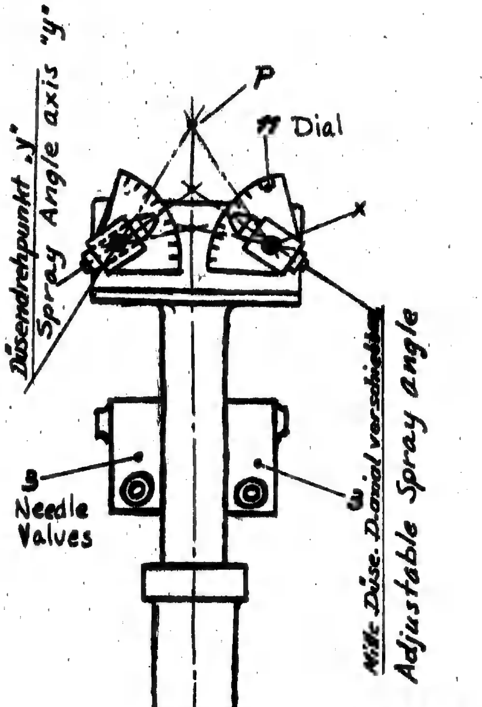
h. The above action allows the air on the large side of the quick action valve to go out to the atmosphere. The quick action valve closes in one second.

i. Air then flows through the lead pipe to the regulator and to the testing chamber of the wind tunnel. This regulator was operated by hand until the midile of 1952. At that time, the servo system was put in and tested. This permitted automatic operation of the regulator valve. [redacted] 25X1

j. [redacted] not know how closely the pressure was controlled. Models were tested during runs up to one minute in duration. [redacted] required to prepare technical literature for this valve system in January 1950. This was submitted to Institute 88. 25X1

SECRET





Ansicht in Richtg. „A"
View in direction "A"

1. Cylinder (aircraft shock asb)
2. Mounting Bracket
3. Needle Valves
4. Control rod (flow reg)
5. Universal Joint
6. Gas-proof Seal
7. Handwheel
8. Observation window
9. Manometer (Jet pressure)
10. Nozzle holder
11. Dial (for setting Nozzle angle)
12. Piston (raises and lowers nozzles)
13. Pedal (for oper of piston)

NOZZLE TEST STAND

Sketch # 1

SECRET

25X1

Spray and Combustion Test Chamber

1. This equipment was designed to permit study of combustion characteristics at various fuel nozzle angles and rates of flow. The tests were recorded by photographic equipment located in the observation room.

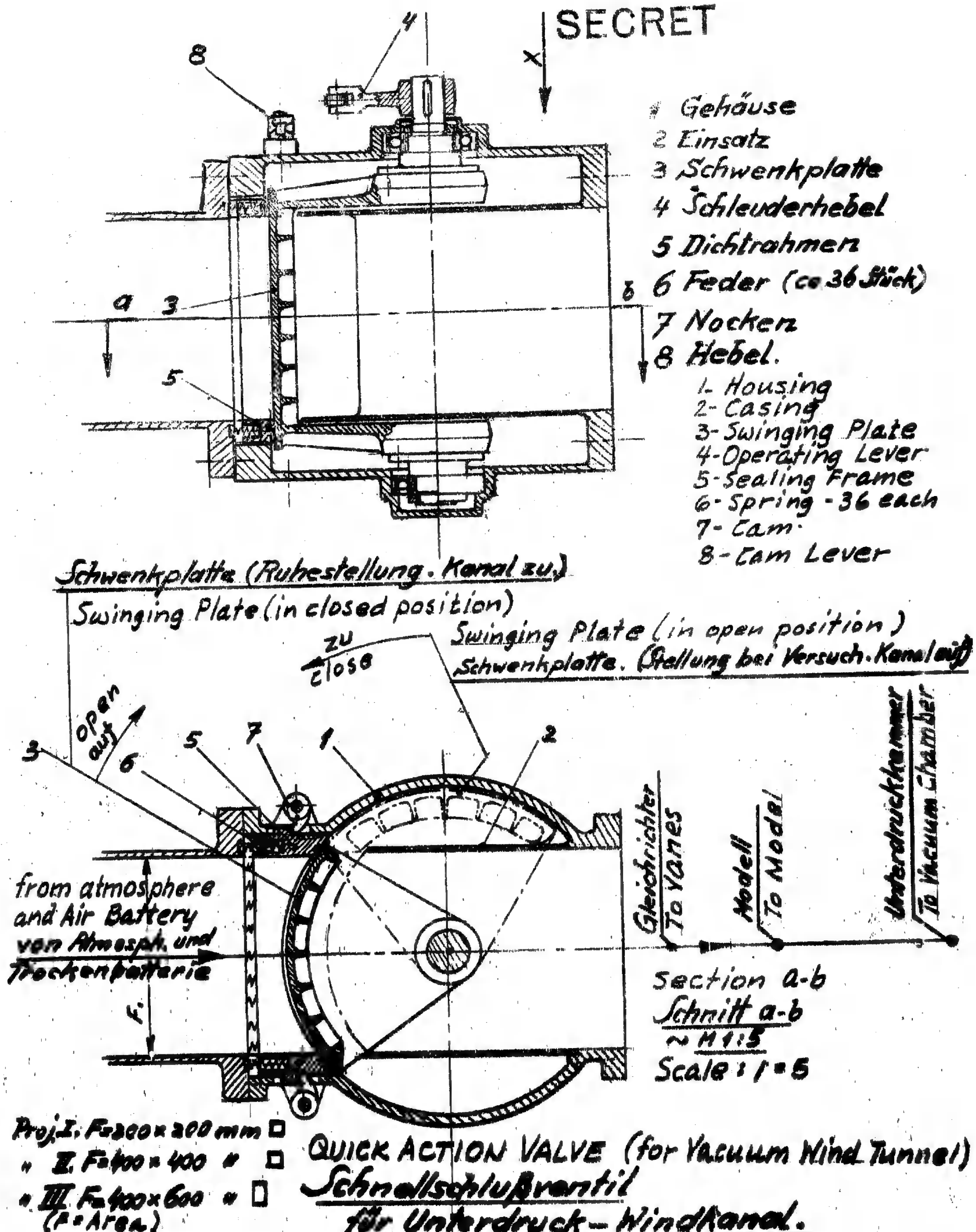
2. Before the test stand could be completely operational, it was necessary to modify the original design which did not include remote control of the nozzle angle.

25X1

Sanitized Copy Approved for Release 2010/05/12 : CIA-RDP80-00810A002000690002-2

25X1

SECRET



QUICK ACTION VALVE (for Vacuum Wind Tunnel)

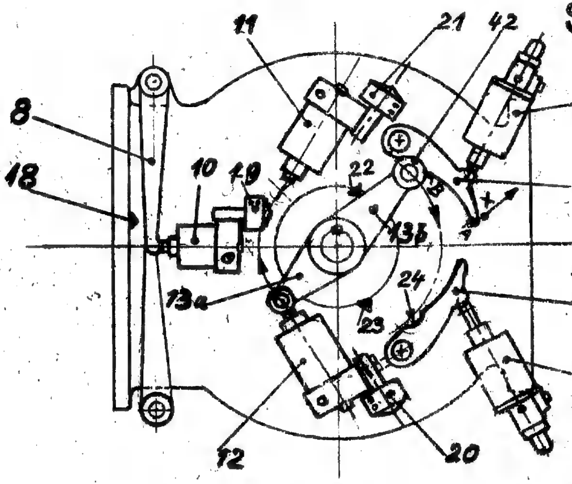
Schnellschlußventil
für Unterdruck-Windkanal.

(Ventil in geschlossener Stellung gezeichnet.)
(Valve shown in closed position)

SE[illegible]

25X1

SECRET



Ansicht in Richtung X
View in direction of "X" on page 1

Schnellschlußventil ~M 1:5 Scale 1:5
für Unterdruck-Windkanal.
Ventil in geschlossener Stellung gezeichnet.

8 Hebel (zum Abheben des Dichtrahmens 5)
10 Druckzylinder (" " " 5)
11 Impulszylinder (zum Schließen des Ventils)
12 Impulszylinder (" Öffnen " ")
13a Schleuderhebel (zu den Impulszylindern)
13b Hebel (zu den Dämpfungszylindern)
14 Kurvenhebel (zum Abfangen beim Schließen)
15 Kurvenhebel (" " " Öffnen.)
16 Dämpfungszylinder (zum Abfangen beim Schließen)
17 Dämpfungszylinder (" " " Öffnen)
18 Elektr. Kontakt.
19 " Stoßmagnet
20 " "
21 " "
22 " Kontakt
23 " "
24 Einbettung.

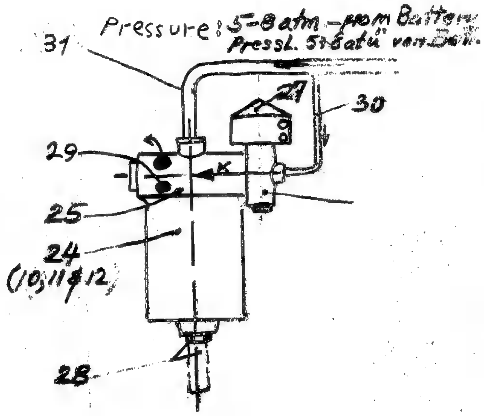
Note: See page 24 for translation of these parts.

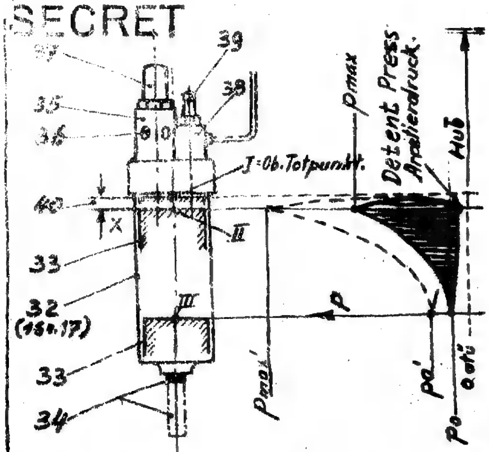
QUICK ACTION VALVE
(for Vacuum Wind Tunnel
(shown in closed position)

SECRET

25X1

SECRET





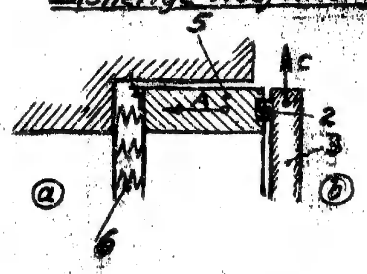
X = Rückgang beim Einschnappen der Rolle 42 in Einbettung 24.

Impulszylinder (10,11 u.12)
IMPULSE CYLINDER

Dämpfungszylinder. (16 u.17)
DECELLERATION CYLINDER
x= Stroke used in detent

Neues Abdichtverfahren.
IMPROVED SEALING METHOD

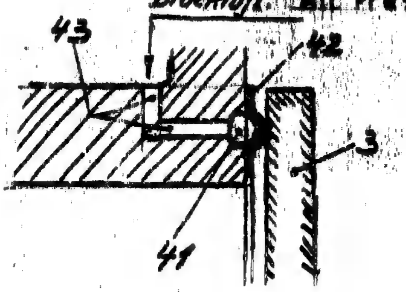
Bisherige Ausführung. Original Method



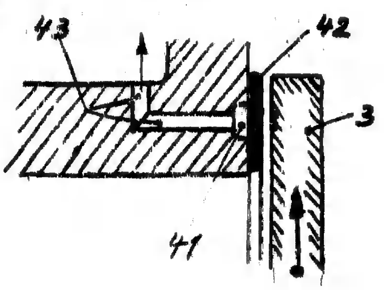
New Method
Neue Ausführung.

geschlossen closed

Druckluft. Air Pressure



geöffnet. open



Description of the Quick Opening Valve for a Vacuum Wind Tunnel

A. General Structure. /See sketch on page 21 7. In the housing (1) is a 90° arc plate (3) fastened to two pivots in the ball bearing. The upper pivot is sealed from the atmosphere and is tightly connected with the operating lever (4). Constructed into the flange d tube at the left of the housing is the sealing frame, (5) which is adjustable and which, in a closed position, will be pressed by springs (6) against the swinging plate. Cam (7) and lever (8) are pressed to the housing. There are two cams on each side, so that the sealing frame (5) is pressed by the springs at 4 points. In the closed position there will be about a two millimeter air gap between cam (7) and the sealing frame (5).

B. Operation

1. Opening of valve at beginning of test. The compressed air from the battery (about 5-8 atms) is switched on. Beginning of test - electrical toggle switch in testing room is placed in the "on" position. Thrust magnet (19) receives electric current, piston rod of cylinder (10) will press lever (8) and, therefore, cam (7) to the left, by means of which the sealing frame (5) will raise approximately three millimeters from the swinging plate. At the end of this stroke, lever (8) touches the contact (18), which permits the flow of electric current to the thrust magnet (20) of the cylinder (20). The piston rod of cylinder (12) will then accelerate forward (approximately 3.5-4 cm.) and will set in motion the operating lever (13a) with the swinging plate (3) until the swinging plate reaches the position "valve open". After reaching this position, the lever (13b) will be in contact, (23) which interrupts the current flowing from contact (18) to the thrust magnet. The piston rod of cylinder (12) will release immediately. (The air in the cylinder will escape into the atmosphere.) In the upward motion of swinging plate (3) the following mechanical process takes place:

   a. Initially, lever (13a) receives an increasing torque for approximately 3.5-4 centimeter linear distance. Then a partial coasting of the plate takes place. During the second half of the travel, the curved lever (15) and the damping cylinder (17) decelerate the operating lever and plate so that they come smoothly to rest in a circular detent (24) at the final position.

2. Closing of the valve after test. Electrical toggle switch in testing chamber is placed in "off position". The thrust magnet (21) receives current, the piston and piston rod of the impulse cylinder (11) transmits to the accelerator (13a) and the tilting plate (3) a counter impulse. The closing impulse, coasting, and deceleration is the same as in the opening process. In the final position, lever (13b) touches contact (22) which interrupts the current in the thrust magnet (19). The piston rod releases immediately; lever (8) and cam (7) swings to the right and the springs (6) press the sealing frame against the tilting plate (3) and the valve is closed again.

25X1

3. Description of impulse cylinder (24) (corresponds with 10, 11, and 12) [See sketch page 23].

   a. Components.

      24. Cylinder with piston and piston rod (28)
      25. Control slide
      26. Small control valve
      27. Thrust magnet (corresponds with 19, 20, and 21)
      28. Piston rod (connected to piston)
      29. Openings (for outlet of compressed air into atmosphere)
      30. Conduit to the small control valve (in actual construction a bore in cylinder head)

      31. Conduit for compressed air to the piston

   b. Operation. Thrust magnet (27) receives current, and presses the small control valve (26) downward. Air flows from conduit (30) through a circular channel of the small control valve (26) to the control slide (25) which moves to the left (direction x). The compressed air (about 5-8 atü) now acts directly upon the piston (from conduit (31) through circular channel of the control slide 25), so that the piston rod (28) moves downward (against the accelerator 13a). When the electric current from the thrust magnet is interrupted, the thrust magnet snaps upward by spring tension. The control slide (25) is thrown by spring tension to the right, and the compressed air goes through opening (25) into the atmosphere. (Conduit (31) is now closed.) Therefore, piston rod (28) will regain its resting position.

4. Description of the deceleration cylinder (32) (corresponds with 16 and 17) [See sketch page 23].

   a. Components.

      32. Cylinder
      33. Piston Position I Highest point
          II Stopping point
          III Resting position
          - The piston is not held down by spring tension, but by pneumatic pressure.

      34. Push rod
      35. Differential piston valve
      36. Outlet into atmosphere
      37. Adjustment of differential piston valve (35)
      38. Valve for control of the loading pressure
      39. Adjustment of valve (38)
      40. Compressor chamber

   b. Operation. In opening the valve, the push rod (34) is pushed upward and the air above the piston (33) is compressed. The back pressure exerts the necessary braking force on the swinging mass. The braking effect (power dissipation of the swinging mass) is regulated in such a way, that the barrel (42) will snap into the detent (24) smoothly but without great shock. The

 25X1

braking thrust shortly before the detent position reaches about 18-27 atm. This maximum compression thrust in chamber (40) will drop immediately, after the barrel (42) has reached point B, to 2-3 atü. This is necessary to provide an accurate locking device. The release of pressure is taken care of by a differential piston valve (35), which opens at a high pressure (16-27 atü, adjustable by screw and spring (37)), closes at a very low pressure and will only open again at a high pressure. With the barrel (24) in detent (24), the piston automatically receives a pressure of about 2-3 atü (through valve 39), which is exactly enough to hold the swinging plate (3) firmly in its place.

5. Improved sealing procedure for the quick opening valve for the low pressure wind tunnel. [See sketch page 23]

a. Original Method.

(1) Closing. Sealing frame (1) is pressed onto swinging plate (3) by spring tension. Chamber A is closed from Chamber B by rubber gasket.

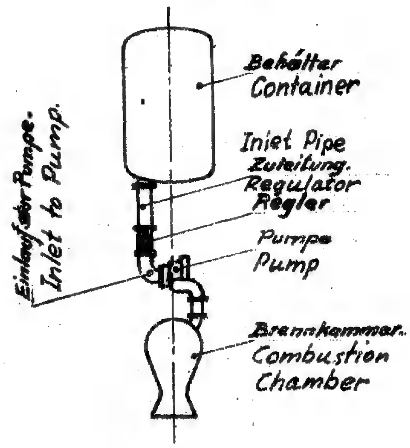
(2) Opening. The sealing frame (5) moves in direction a, until rubber sealing gasket (2) and plate (3) has about three millimeters air gap. The swinging plate (3) is then moved into direction C.

b. Improved Sealing Method.

(1) Closing. Compressed air flows through opening (43) to channel (47) and presses the rubber sealing gasket (42) against the swinging plate (3).

(2) Opening. Compressed air escapes from channel (47) through opening (43) into the atmosphere. The rubber sealing gasket moves because of its resiliency and because of the vacuum in chamber a. The swinging plate can then be turned (opened).

SECRET 25X1



Einbau eines Durchsatzreglers in die Zuleitung zur Brennstoff-Förderpumpe.

Der Regler hat die Aufgabe, auftretende Druckschwankungen am Einlauf zur Pumpe zu Regeln.
Einlaufdruck = 3 atü. (zur Pumpe)
zulässige Schwankung = 3 atü $^{+0,1\text{ atü}}$

INSTALLATION DIAGRAM OF A FLOW REGULATOR IN THE INLET PIPE OF THE FUEL BOOSTER PUMP

It is the function of the Regulator to control fluctuating pressure which appears at the inlet to the pump.

Inlet pressure: 3 atm (to the pump)
Allowable fluctuation: 3 atm $^{+0.1\text{ atm}}$

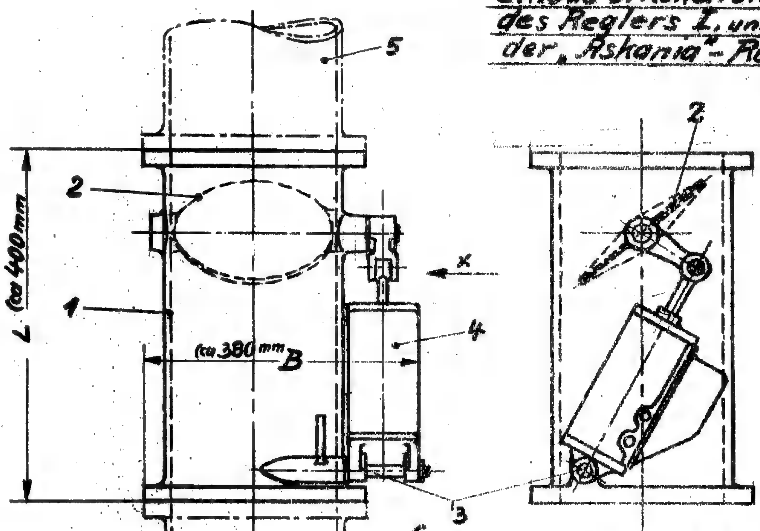
Sketch #1

SECRET

SECRET

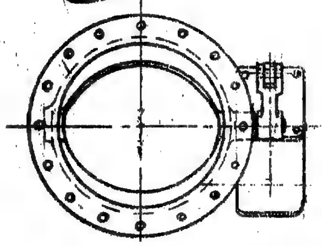
25X1

Einbau u. Konstruktive Ausführung des Reglers I. unter Verwendung der „Askania"-Rudermaschine.



Ansicht in Richtung X

View in direction of X



1. Housing
2. Throttle Plate
3. Rotating mounting of Servo Unit
4. "Askania" Servo Unit
5. Inlet pipe
6. Inlet to Pump

1 Gehäuse
2 Drosselklappe
3 Drehbare Aufhängung der Ruderm. 4
4 „Askania"- Rudermaschine.
5 Zuleitung
6 Einlauf zur Pumpe.

REMARKS: Difficult to install because of large size (width & length). Unsuitable because of uncertain flow and energy conditions at the throttle plate.

Bemerkung: Einbauschwierigkeit wegen großer Abmessung (B u. L.). Außerdem unklare Strömungs- u. Kräfteverhältnisse an der Drosselklappe.

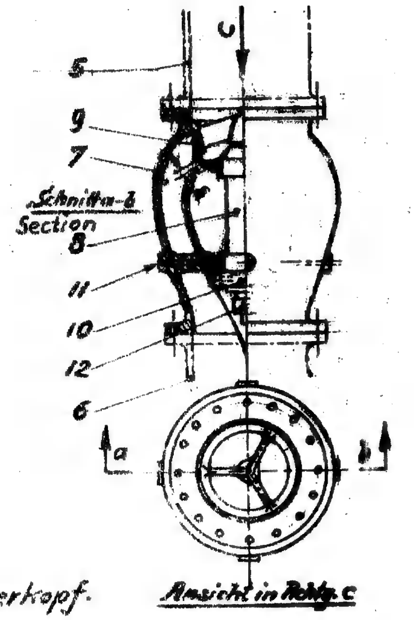
INSTALLATION & ASSEMBLY of REGULATOR I, using the "ASKANIA" SERVO UNIT

Sketch #2

SECRET

25X1

5. Inlet Pipe
6. Inlet to Pump
7. Housing
8. Cylinder
9. Sliding Ring
10. Cylinder Head
11. Inlet holes to the Cylinder Head
12. Membrane Housing



5 Zuleitung.
6 Einlauf zur Pumpe
7 Gehäuse
8 Zylinder
9 Ringschieber
10 Zylinderkopf
11 Zuleitungsbohrungen z. Zylinderkopf.
12 Membrangehäuse.

Einbau u. konstruktive Ausführung
des Reglers Var. II.
Hydr. Regelzylinder Zentral in Rohrleitung eingebaut, mit Ringschieber.
(Abmessungen kleiner als bei Var. I)

INSTALLATION & ASSEMBLY of REGULATOR (variation II)
Hydraulic regulating cylinder is centrally fitted into pipeline, with sliding ring.
(Dimensions are smaller than in variation I)

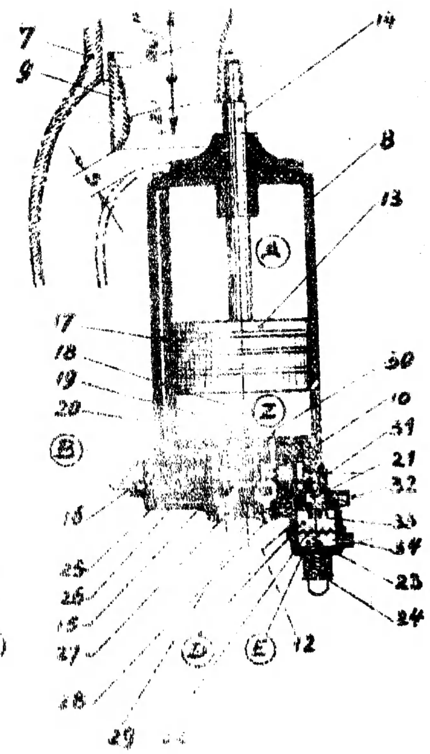
Sketch #3

SECRET

25X1

SECRET

7. Housing
8. Cylinder
9. Sliding Ring
10. Cylinder Head
13. Piston
14. Piston Rod
15. Control Slide
16. Stop & Spring Set Screw
17. In and Outlet passage
18. Channel
19. Channel
20. Opening (bore)
21. Valve
22. Membrane
23. Spring (for adjusting membrane tension)
24. Set Screw (" " " ")
25. Leakage bore
26. Channel
27. Outlet of the pressure fluid
28. Inlet " " " "
29. Leakage bore
30. Channel and Opening
31. Opening (bore)
32. " (Controls pressure from pump inlet
33. "
34. Constant pressure - Inlet (3 atm)



7 Gehäuse
8 Zylinder
9 Schieber (Ringschieber)
10 Zylinderkopf
13 Kolben.
14 Kolbenstange.
15 Steuerschieber
16 Anschlag u. Federeinstellschraube.
17 Ein- u. [illegible] Bohrung zu Raum (A)
18 Kanal u. Bohrung
19 Kanal u. Bohrung
20 Bohrung
21 Ventil
22 Membran
23 Feder (zum Einstellen der Membranspannung)
24 Stellschraube (" " " " " ")
25 Leckagebohrung
26 Kanal
27 Austritt der Druckflüssigkeit.
28 Eintritt " " " "
29 Leckagebohrung
30 Kanal u. Bohrung
31 Bohrung
32 " " (Steuerdruck von Pumpeneintritt)
33 " "
34 Const. [illegible] druck - Eintritt (3 atü const)

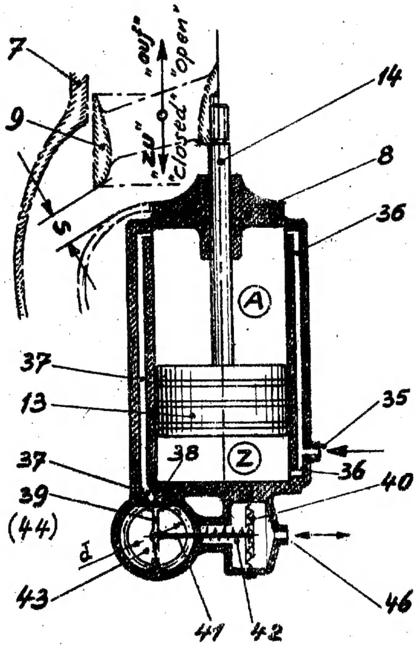
SCHEMATIC of the ASSEMBLY of the CYLINDER (part #8) (Control of piston with [illegible])

[illegible] Darstellung [illegible] Zylinders 8 [illegible] (Prinzip. [illegible] Schieber-Steuer.)

SECRET

25X1

SECRET



Schem. Darstellung der Konstr. des Zylinders 8 und der Steuerung. (Prinzip „b" mit Steuerung durch eine Abdeckplatte. Umgekehrtes Prinzip der „Askania-Strahlrohrsteuerung.)

35 Bohrung (Konstanter Druck zu Raum A u. Z.
36 " " "
37 Auslaßbohrung von Raum A
38 Einlaß-Bohrung zu " Z
39 Schwenkhebel
40 Membran
41 Schubstange
42 Feder
43 Austrittstutzen
44 Abdeckplatte
45 Lenkfederblatt
46 Eintritt der Steuerdruckflüssigkeit (Regeldruck)

35. Constant pressure input
36. " " "
37. Outlet channel from chamber "A"
38. " " " " "B"
39. Lever Valve
40. Membrane
41. Connecting rod
42. Spring
43. Outlet sleeves
44. Valve plate (shown on next page)
45. Mounting leaf spring (shown on next page)
46. Control pressure inlet.

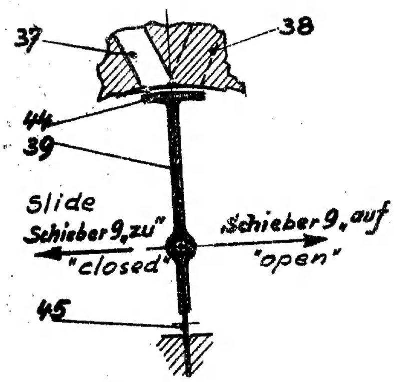
SCHEMATIC DWG of CYLINDER (8) & CONTROL SYSTEM (Method "B" using a Lever type valve)

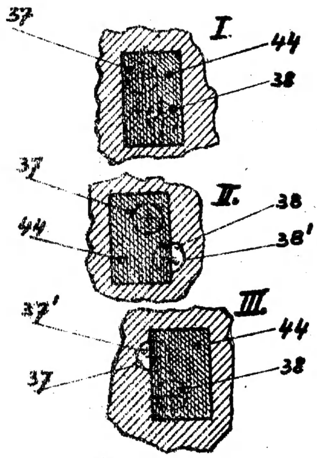
Sketch #5

SECRET

25X1

SECRET





I Ruhestellung des Kolbens 13. (Der Kolben hat jedoch etwas Tendenz nach oben (= Schieber 9, „auf", wegen Überschußkraft durch die volle Kolbenfläche in Raum „z" gegen Kolbenfläche in Raum „A" minus dem Querschnitt der Schubstange 14.)

Stellung II Druck = über 3,1 atü (in Pumpeneinlauf. Kolben geht nach unten, Durchgang „S" wird kleiner.

Stellung III. Druck = unter 3 atü (in Pumpeneinlauf. Kolben geht nach oben, Durchgang „S" wird größer.

I. Piston (13) in neutral position. (The piston has a tendency to move upward because of the larger area in chamber "Z")

II. When pressure goes above 3.1 atm, (at the inlet to pump) piston will move downward, and passage "s" gets smaller.

III. When pressure goes below 3.0 atm (at inlet to pump), piston moves upward and passage "s" gets larger.

CYLINDER CONTROL SYSTEM (Method "B")

Sketch #6

SECRET

25X1

Description of the Flow Regulator for the Fuel Supply

A. Requirements.

1. The fuel which flows from a container through the inlet pipe to the fuel-booster pump, should be regulated in such a way that the inlet pressure at the intake of the pump will be 3 + 0.1 atmospheres.

2. The regulator must be built into the inlet pipe.

3. The Askania Servo-Unit should be utilized as the controlling mechanism.

B. Description of Regulator [See pages 27, 28, sketches No. 1 and No. 2]. The fuel, coming from container through inlet pipe C, flows through the adjustable throttle to the pump. If the pressure at the inlet of the pump drops below three atmospheres, then the slot will get larger by extension of the servo unit (4). When the pressure goes beyond 3.1 atmospheres, then the slot S closes through the retraction of the servo-unit (4).

C. Description of Regulator [See pages 29, 30, sketches 3 and 4]. The two cylinder chamber A and Z are initially under equal pressure, (about 10 atmospheres). Actually, the piston moves upward slowly, because of the difference in area of the top and bottom of the cylinder. The piston rod (14) raises the sliding ring (9) and enlarges slot S and with it the rate of flow, until the pressure reaches 3.1 atmospheres at the inlet to the pump. When the pressure increases to 3.1 atmospheres, fluid will flow through openings (32) and (33) from the inlet of the pump to the chamber D and will move the membrane (22) and valve (21). Then a pressure of 3.1 atmospheres will appear through opening (31) at the control piston (15) and push towards the left. The compression fluid flowing into chamber Z is throttled and the outlet from chamber Z (opening 19) is opened. By displacement to the left of control piston (15), the passage (18) to chamber A is opened and the exit passage (26) is closed. This creates an increase of pressure in chamber A. The piston (13) and valve (9) move downward and slot S becomes smaller, until the pressure at the fuel pump reaches three atmospheres. At this pressure, the membrane (22) drops and valve (21) closes. The control piston (15) is pushed to the right by spring action (16) and valve (9) is again actuated. Since this control system would probably be unstable, a third solution was developed.

D. Improved Regulator Control System [See sketches on pages 31 and 32] This system differs in the method of controlling the fluid to the two chambers A and Z of the regulator. Both cylinder chambers A and Z receive a constant pressure from inlet (35) through (38) and (39). This is done through a lever valve (39) that is actuated by the diaphragm. This method allows proportional control and would presumably offer a stability that is higher than that obtainable with the previous method.